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Cooperative Extension Work in Agriculture and Home Economics

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A STUDY OF THE POSSIBILITIES FOR IMPROVED METHODS OF DETERMINING AND RECORDING MERIT IN SHEEP

By
Keith Jones
National 4-H Club Fellow 1/
1936-37

Extension Studies and Teaching Section
Division of Cooperative Extension
Extension Service

and

Animal Husbandry Division
Bureau of Animal Industry

1/ Two National 4-H Club Fellowships, providing for 9 months' study in the United States Department of Agriculture, are awarded each year by the Payne Fund, New York City.

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1148-37

F O R E W O R D

Mr. Keith Jones, the author of this circular, is a young man with a practical livestock-production background. In choosing to make the study herein reported he thus had a producer's appreciation of the need for improving the usual methods of determining and recording true merit in sheep. Mr. Jones has discussed in some detail several systems which have been used in foreign countries; also, he comments on the advantages and disadvantages of our own show-ring standards of judging sheep.

The original research conducted by Mr. Jones on this project is, in itself, not startling in its revelations. However, the methods used may readily become the forerunner of revolutionary and constructive changes in the field of appraising both wool and meat values of sheep and thus prove this effort to have been one of real pioneering worth.

Studied perusal of this report by all who are interested in the betterment of sheep-judging technique is therefore recommended.

C. D. Lowe,
Senior Extension Animal Husbandman.

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A STUDY OF THE POSSIBILITIES FOR IMPROVED METHODS OF DETERMINING AND RECORDING MERIT IN SHEEP

INTRODUCTION AND BACKGROUND

From the dawn of civilization sheep have been produced for clothing and food. Sheep were probably among the animals earliest domesticated by man. The inhabitants of the prehistoric lake dwellings of Switzerland were known to have maintained flocks, and Biblical records indicate the importance of sheep to the ancient Hebrews, by whom they were regarded highly in religious services.

The early domesticated sheep bore light fleeces of indifferent quality. Those long-legged, relatively coarse, late-maturing animals possessed good foraging characteristics, but could not be considered efficient producers of either mutton or wool when compared to the highly specialized breeds of the present era.

As the sheep industry has progressed down through the years, additional emphasis has been given to the progressive breeding of individuals for one or more specific purposes. Certain breeds, such as the Rambouillet, have been developed primarily for the production of wool. Another group of breeds, as typified by the Southdown, has been developed for the primary purpose of supplying the choice cuts of mutton and lamb. Still a third group, such as the Corriedale, is of a dual-purpose nature, adapted to the production of both wool and meat.

The production of wool was the primary objective of the sheep industry until the last decade of the nineteenth century. Records indicate that the first sheep introduced into the American Colonies sheared a fleece that averaged less than 2 pounds per individual. Although some attention was given to the breeding and improvement of sheep by colonial leaders, there was comparatively little actual progress until about 1807. The increased demand for wool and the rise in prices, especially for the finer grades, coupled with introduction of the Merino, were important influences in the improvement of wool during the years that followed. The average annual weight of fleece produced per sheep in the United States has been increased from 2 pounds to approximately 8 pounds in the last century. After 1890, the demand for mutton became sufficiently important to encourage commercial sheep producers to consider the production of both mutton and wool. Emphasis was placed on mutton conformation - broad backs and loins, depth of body, full legs of mutton, early maturity, and uniformity of finish.

Much of this early improvement was a result of the activities of breed associations, which were organized to promotr and encourage the production of a single breed. These associations continued selection toward a semidefinite ideal, and by mating of those animals that possess the desired physical characteristics, the breeds have become established. Individual breeders, anxious to dispose of surplus breeding stock and desirous of helping

their association, have advertised and encouraged the production of their particular breed. It is possible that entirely too little attention has been given to the question of the adaptation or suitability of the particular breed to fit the specific conditions to which it is subjected. The tendency has been for breed associations to compete with one another rather than to cooperate and raise the general level of the sheep industry.

Under present conditions, the breed association usually sets up a score card giving the number of points that are allotted for each desirable physical characteristic. Physical characteristics that are regarded with disfavor or as making an animal ineligible for registration, require the subtraction of a given number of points from the perfect score. An illustration of the ideal male and female of the breed is usually published by the association and distributed to breeders and other interested parties. Since each breed has its own individual peculiarities or physical characteristics that distinguish it from the others, there is necessarily a wide variation in the allocation of points. These breeds that have been developed primarily for wool production place more points on this physical characteristic than is true of the breeds developed primarily for mutton, and vice versa.

Outside these arbitrary standards and ideals that have been set up by the associations, little attention is given to concrete requirements which individual animals must meet before they become eligible for registration. The record of performance of the sire and dam is seldom consulted in an effort to determine the genetic factors that may cause this individual to be highly desirable, mediocre, or even a low-grade representative of the breed. The breed association requires that the individual on which registration is requested be sired by a recorded sire and from a recorded ewe, and certain associations list specific physical peculiarities that render an animal ineligible to registration. The accuracy of the application for registry is left to the judgment and honesty of the breeder or owner. The secretary of the breed association, upon receipt of the application for registry, checks the lists for visible errors, and if everything appears correct the sheep are registered; for a number of breeds a group of association eartags is forwarded to the breeder. Each eartag bears an association symbol and individual number and is issued for a specific lamb. To the breeder is left the responsibility of placing these tags in the ears of the correct individuals. Throughout this entire process, no representative of the breed association has judged the merits of the individuals or passed upon the desirability of their physical characteristics.

The application for registry blank asks the name and number of the sire and dam, the flock name or number of the individual to be registered, the age, and in a few cases questions that are peculiar to the breed. The owner or his designated representative is asked to sign the application. No reference is made to the physical characteristics of the sire and dam. Under this system, the breed association has no record of the desirable or outstanding points of the individuals recorded within their association. In fact, it has little or no concrete information regarding the relative merit of its breed, other than that obtained by observation and inspection in the

field. The breeder is usually familiar with the sires, as there are fewer of them, but were he to select a certificate of registration at random from his files he would doubtless have difficulty in describing the physical characteristics of the particular individual.

To compare adequately the merits of this individual with other members of the flock would be even more difficult. The only method of obtaining such information would be to inspect the flock. It is generally recognized that progressive and conscientious breeders register only the more desirable individuals, but there is no requirement in the American system of registry which prevents the breeder from recording inferior individuals. Such individuals may be used for breeding purposes and the production of more inferior individuals, or sold to the unsuspecting buyer on the strength of their pedigree, either of which results in the lowering of breed standards.

Even though we accept the fact that a large majority of registered animals are of the more desirable type, such a method of unrestricted registration necessarily produces a wide diversity of quality. To men who know sheep and the sheep business, these inferior individuals "stand out" and spoil the appearance of an otherwise desirable flock, even though their numbers are much in the minority. Such an exhibition cannot help but create an unfavorable impression toward the breed and its supporters. All too often it is these inferior individuals that are offered for sale at low prices. The hopeful beginner may consider them a good buy to initiate his breeding program, especially if he is not well acquainted with the problems of the sheep industry. He may not realize the poor quality of his stock and continue production, wondering why he does not make valuable sales and produce high-class market lambs and wool. Many beginners have been disappointed because someone sold them a pedigree. Each of these failures means a mark against the breed and against registered sheep in general. Each sale of inferior low-priced animals means the mere filling of orders with stock that may prove detrimental to all concerned. Lessened demand means fewer sales, which, measured in dollars and cents, affect all who are engaged in the business of producing purebred sheep.

The first agricultural fairs in the United States listed classes for sheep and suitable prizes as further inducements to the production of desirable individuals. Agricultural fairs continue to offer classes and prizes, and the show ring has been considered a measuring stick of outstanding individuals in this country. The system of classes is so arranged that all animals of similar age and sex compete for honors within the breed. Thus the fairs maintain classes for ram lambs, yearling rams, and aged rams with the winner of each class competing for champion ram. Similar classes are arranged for females, except the class for aged ewes which is generally omitted. Group competition, such as flock, get of sire, and pen of ram lambs, is usually offered. The owner or shepherd carefully prepares the animals for exhibition. The final placing of each, according to his or her physical merit, is left to the discretion of the judge. Of necessity, there are many elements of individuality affecting both the judge and the sheep which enter into the selections.

At best the show-ring system is purely an arbitrary one and the judge is forced to make many compromises in his own mind. The fair association retains the number and name of the prize-winning individual and the name and address of the owner, but there is no record to be filed which gives the reasons for placing or a description of the fine merits of the winning animals. The judge may occasionally deliver oral reasons, but too often these are quickly forgotten. It is difficult for anyone, except the judge, to receive any pertinent guide as to the desirable physical characteristics possessed by the winners.

Yet the show ring has aided materially in the encouragement and promotion of the use of outstanding individuals and has indicated the way toward the production of sheep which possess desirable characteristics. This has been true of both the mutton and the wool breeds and even of wool shows. It would seem that the procedure would be much more educational and beneficial to the sheep industry if some record of desirable physical and genetic characteristics were retained. This record might contain a brief description of the strong and weak points of each individual, and a summary of the record of performance of the sire and dam. Such a record would serve as a guide to breeders and furnish them with an indication of those merits which the breed is expected to possess.

The judge encounters close placings in many classes as he selects his choice individuals, but mutton characteristics apparently have the advantage over wool characteristics in that it is much easier for the naked eye to gage the depth and width of body and the plumpness of the leg of mutton than it is to judge correctly the features of wool. The judge examines the fleece for density, luster, crimp, length of staple, black fibers, and fineness and uniformity. Certain judges have become very efficient at this task. Several factors are quite evident, such as the presence of black fibers or the relative length of staple, but the individual wool fiber is a very minute and difficult object to study with the naked eye. A predominance of fibers of one size seems to attract the eye from fibers of a widely different degree of fineness, and therefore causes the observer to misjudge the actual average fineness of the fleece.

It is interesting to hear the comments of participants in 4-H, Smith-Hughes, or collegiate judging contests immediately after the placing of a class of sheep. Body conformation does not seem to cause so much comment, but it is evident that difficulty has been encountered in analysis of the wool. Nevertheless, judging teams are furnished with classes of sheep, and they are expected to formulate definite opinions as to the grade of the wool found in the class. In many classes the actual distinction may be minor but the score cards used by certain groups include a blank for wool, and the student judge is discounted unless he agrees with the official. It is extremely doubtful if the educational value of such a contest is important where the infinite differences are so abstract in nature.

The prevalent method of judging fleeces at a wool show by touch and with the aid of the naked eye is relatively superficial when the essential details of quality are considered. It is in the wool show, where the fleeces

are readily available, that careful inspection of cross sections with the use of the microscope would definitely determine actual fineness and uniformity. The fibers might well be tested for strength and measured for length if a complete picture of the fleece is to be determined. Definite information of this type regarding wool would furnish the sheep breeder with basic facts upon which he might build a progressive breeding program pointing out the weaknesses of his own flock and setting up a goal which might be attained. The production of fleeces of quality and uniformity would be increased.

Although the above practices have not been entirely ideal, there is no doubt that the systems in practice have resulted in considerable improvement of the industry. The last century has been an era of development and accomplishment for the sheep industry. Breeds have been improved and new breeds developed, wool production has been increased, and the general level of the industry has been raised. It is probable that if progress is to be continued, with general improvement, certain weaknesses in the present system of breeding and registration must be strengthened.

It is the purpose of this study to analyze some of the weaknesses of the system of judging and registration in use in the United States and to suggest certain changes in method that might possibly aid improvement activities in this country.

It is apparent that there are no definite regulations or organized efforts to improve the quality of sheep in this country. Progress has been made in mass production, and foreign livestock men appear to be impressed by the quality. Nevertheless, there are many improvements that might be desirable, if the general level of the sheep industry is to continue to improve in the future.

Two types of study have been undertaken to present some concrete suggestions which may be of some assistance to American sheepmen. The first is a brief evaluation of registration and judging of sheep as conducted in Great Britain and in Germany. The second is the practical application at the National Research Center of a modified German system of scoring, which possibly has some merit over our present practices.

The English flock system of registration differs from the system in use in the United States in that flocks instead of individuals are registered.

A brief resume of the English system follows:

The English Flock System of Registration

The publishing of the annual flock book is the important factor in the flock system of registration. The rules and regulations of the various breed associations require that each owner of a registered flock report by a given date the complete history, number, and description of the animals owned by him. A standard printed form supplied by the secretary is used for this purpose, and each association has its deadline date for flock returns. The printed form is known as the "entry form for annual record flock in flock book."

This annual entry form is very complete. The owner lists the number of two-tooth, four-tooth, six-tooth, full-mouthed, and older ewes of which his flock consists; also the number of ram lambs, yearlings, and aged rams. His name in full, postal address, railway station, telegraph office, agent, and the page or pages in the volumes of the record book where the flock was originally entered are also included.

The registration files are compiled from this entry form and from the annual subscription. Information is also obtained concerning the replenishment of the flock during the year by purchase, covering the age of the sheep, the number, from whom purchased, and at what price. The bylaws of the English society state that all flock-owning members shall notify the secretary of all sales of breeding sheep sold to go into a registered flock, or for foundation of such a flock, whether the sales are by auction or by private treaty. This notification must be furnished in writing within 28 days after the sale, or the council may refuse to register such sheep. The society may derive a sales tax on all animals that are sold. The English society is able to check and recheck the location or disposal of all sheep owned by the members. The name, age, and association number of all the rams in service during the year are then listed in the flock book, and a space may be allowed for prizes won during the year. Failure to submit this statement sworn to by the owner results in the omission of his flock or registrations from the flock book when it is published.

Many breeders register their outstanding individuals, including the show flocks. All animals for export must be individually registered.

A majority of English breeders use the tattoo method of identification, although a few use eartags. The leading record associations use an officially recorded trade mark for their breed. Representatives of the leading societies are designated as official tattooers and are responsible for the accurate marking of all sheep. As a rule the lambs must be officially tattooed before they reach 1 year of age. A small supplemental fee is charged to offset the expenses of this service.

The Württemberger breed has been selected to represent the system of registration and scoring in use in Germany. This system differs from the United States system in that an official representative of the breed association inspects and scores each animal before application for registry is made.

Brief Resume of Scoring Procedure for the Württemberger Breed

The standards set by the Württemberger breed exclude from registration those individuals seriously defective in respect to body conformation or wool. A maximum of 50 points is allotted for body conformation, and each animal is required to score a minimum of 33 points. Table 1 lists the maximum and minimum scores under the five headings involved.

The maximum number of points is seldom accorded any individual. For example, a long neck, white face, or small head would be deducted from the

Table 1. - Body conformation

Heading	Maximum	Minimum
Head.....	8	6
Trunk.....	10	6
Legs.....	10	6
Weight.....	10	7
General impression.....	12	8
Total...	50	33

maximum number of 8 points for perfect head. Narrow rumps, crooked legs, and general impression are recorded in like manner. The standard for the breed requires the ewes to weigh 110 to 127 pounds and the rams 176 to 245 at the age of 1-3/4 years.

A maximum of 50 points is allotted for wool with a minimum requirement of 33 points for each animal. Table 2 lists the maximum and minimum number of points under the five headings relating to wool.

Table 2. - Wool

Headings	Maximum	Minimum
Growth.....	8	6
Outer fleece.....	10	6
Inner fleece.....	10	6
Character.....	10	7
Soundness.....	12	8
Total.....	50	33

Generally speaking, it is practically impossible for an animal to score the maximum number of 50 points allotted for fleece. Breeding animals with bare legs or belly or excessive wool growth are ineligible for registry when deviating greatly from breed type. Stapling of the outer fleece, uniformity, character, and soundness are carefully scored for deductions for all imperfections.

Grading takes place at least once a year, and each animal is scored by the official representative of the breed association. Immediately after grading each animal is tattooed and a "swallowtail" mark is placed in the right ear with a notching forceps. The studbook number and the flock designation allotted

by the studbook to the breeder are placed in the left ear. The registration number of the dam and the year of birth are placed in the right ear of all lambs. An effort is made to register all animals at the age of 1-3/4 years.

Supplementary tests are made each year to eliminate animals unfit for breeding, because they no longer correspond to breed standards. Individuals that have transmitted inferior qualities to their offspring are eliminated.

To obtain some concrete suggestions and to test the practical application of a modified German method of scoring sheep as compared to the American system, a study was conducted at the National Agricultural Research Center, Beltsville, Md.

SET-UP OF STUDY

Score Card for Judging Sheep

A score card for judging sheep was assembled and mimeographed on lightweight 5- by 8-inch cards which could be used for field purposes. The score card is similar to that used by certain German sheep societies in sale and registry work. A number of items were added to the list, and several of the descriptions were changed to fit American terminology.

Only those points are marked on the score card which describe the body conformation or the wool characteristics of the specific individual. The numbers appearing on the animal correspond to the descriptive term for body conformation found in the key for scoring sheep. Thirty-five points relating to body conformation are listed. Descriptive symbols are used to supplement the numbers. For example, a straight line and the number 14 appearing above the back on the figure of the sheep would indicate that the individual to which reference was made possessed a long back.

The letters and symbols describing the fleece appear in the key and are used in marking the wool chart on the score card.

The score card and key appear in figures 1 and 2.

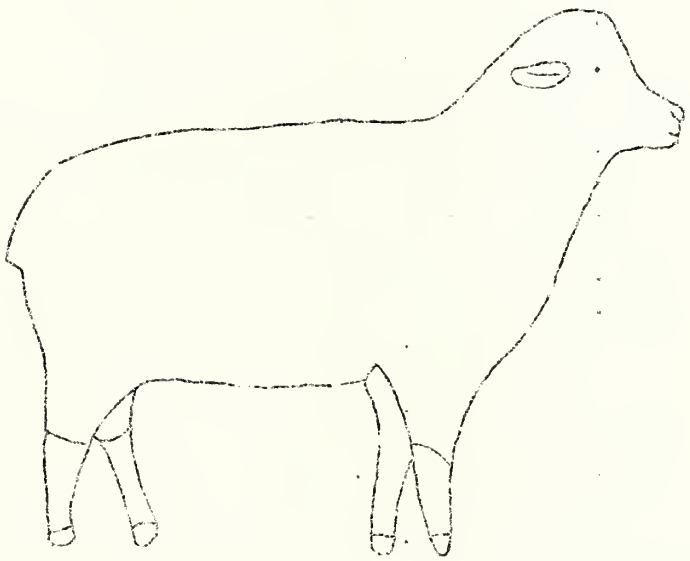
Animals Used in the Study

Six individuals, born in the spring of 1936, were selected from each of four breeds represented at the National Research Center at Beltsville, Md. An effort was made to select representative animals that were typical of the Hampshire, Southdown, Shropshire, and Corriedale flocks maintained at the station. These individuals had received the regular station ration and were well grown and thrifty. None of the individuals had been summershorn, so each was carrying its initial fleece. They were fed indoors during the winter months, and were protected from disagreeable weather. This kept the fleeces reasonably dry, and held the moisture variation at a minimum (table 7).

Station _____ Date _____

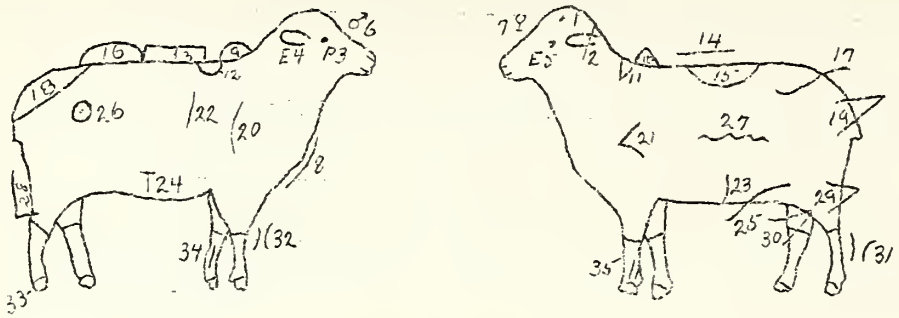
Eartag _____ _____

Breed _____ _____



Topography of growth	Outer fleece	Inner fleece	Trueness to type	General impression

Figure 1. - Score card for field study.



Conformation

1. Traces of horns (scurs).
2. Small ear.
3. Pigmented face and ear.
4. Short head.
5. Long head.
6. Masculine head.
7. Feminine head.
8. Prominent, broad chest.
9. Wide, heavy shoulders.
10. Pointed withers.
11. Ewe necked.
12. Depression behind shoulders.
13. Short back.
14. Long back.
15. Weak back.
16. High loin.
17. Pinched loin.
18. Sloping rump.
19. Pointed rump.
20. Full ribs.
21. Flat or pinched in the ribs.
22. Deep-bodied.
23. High off the ground.
24. Short legged, or close to the ground.
25. Cut up in the flank.
26. Neat, trim appearance or compact appearance.
27. Thick fleshing or well covered.
28. Deep twist with large leg of mutton.
29. Shallow twist.
30. Bowlegged.
31. Hind legs knock-kneed.
32. Narrow in front with knock-knees.
33. Long, weak pastern.
34. Fine bone.
35. Heavy bone or coarse bone.

Figure 2. - Score card and key for judging sheep.

Wool

Topography.

G - Head normally wooled for head.

$\bar{G}$ - Bare head.

$\underline{G}$ - Heavily wooled head.

W - Normally wooled belly.

$\bar{W}$ - Bare belly.

$\underline{W}$ - Heavily wooled belly.

B - Normally wooled legs.

$\bar{B}$ - Bare legs.

$\underline{B}$ - Legs heavily wooled.

Outer fleece.

M - Normal fleece.

$\bar{M}$ - Open fleece.

$\underline{M}$ - Very dense fleece.

Q - Well stapled.

$\bar{Q}$ - Pointed staple.

$\bar{\bar{Q}}$ - Not recognizable staple.

S - Prominent irregular shoulders and withers.

Inner wool.

E - Distinct correct crimp.

$\bar{E}$ - Indistinct crimp.

$\underline{E}$ - Excessive crimp formation.

Figure 2.- Score card and key for judging sheep - Continued.

Subdesignation under E

Z - Twisted.

sch - Greasy.

k - Strong (considerable body).

y - Lacking in uniformity.

T - Texture) firm.
) sound.
f - Felty.

bi - Binders.

ns - Nests.

L - Normal length of wool.

$\overline{L}$ - Short wool.

$\underline{L}$ - Very long wool.

Character and trueness to type.

C - Normal in character, as reflected in vitality.

$\overline{C}$ - Without character.

$\overline{\overline{C}}$ - Wild harsh wool, coarse grade.

T - Wool true to type.

$\overline{T}$ - Irregular growth of the fibers.

$\overline{\overline{T}}$ - Bent, brittle wool.

General impression (freedom from faults).

X - General impression good.

$\overline{X}$ - General impression somewhat unfavorable.

$\underline{X}$ - Animal a select wool type.

Figure 2. - Score card and key for judging sheep - Continued.

Bird's-eye view of scoring scheme for wool in terms of basic symbols

Topography of growth	Outer fleece	Inner fleece	Trueness to type	General impression
G	M	L	C	X
W	Q	E	T	
B	S			

Figure 2. - Score card and key for judging sheep - Continued.

Note: Overlined letters indicate faultiness; underlined letters indicate desirability.

Scoring

Five scorings were made on the 24 lambs at approximately 21-day intervals. The representatives were handled individually and the score cards were filled out as the animals were examined.

The first scoring was made on December 30, 1936; the second, January 26, 1937; the third, February 16, 1937; and the fourth, March 16, 1937. The first four scorings were condensed and placed on one card after the fourth scoring. The scoring was confined to the six animals within the breed and no effort was made to score the individuals of one breed against the individuals of another breed. The cards and numbers were consulted only at scoring dates so that the memory factor could be discouraged as much as possible. Because of the interval between scorings, it is doubtful if more than an exceptional point or two was recalled.

The group was sheared on April 5 and the fifth scoring was made on April 7. This scoring was made in order that the body-conformation charts of individuals before and after shearing might be compared.

Wool Studies

Two wool samples from each animal were taken on January 26 to be used for making cross sections and in determining the actual market grade of the fleece. The first sample was taken midway on the side just back of the heart girth. The second sample was taken high on the thigh or just below and back of the hip joint. Cross sections were photographed of each of the samples

and projected at 500 magnification. A wool comparator[2] was used to determine market grade.

Photomicrographs of the side samples were made in the animal-fiber laboratory of the Bureau of Animal Industry at 500 diameters magnification. The greatest and least diameter of 100 fibers were measured to the nearest micron on each enlargement. From these measurements, the average mean diameter, standard deviation, and the coefficient of variation were calculated for each fleece. A small section of each print is included in the body of the report to show variation among the individual fibers and among the fleeces themselves (figs. 13 to 16).

Body Measurements

It was felt that body measurements would supply concrete figures to support the evidence gathered on the score cards.

On April 9, immediately after shearing, a set of 24 body measurements was taken on each of the 24 animals. Each measurement was made in duplicate, and the average is the figure appearing in the report (table 3).

This group of body measurements has been developed by Dr. Ralph W. Phillips of the Bureau of Animal Industry in his research work on body conformation of domestic animals. A steel tape and specially constructed steel bars graduated into centimeters were used for making these measurements. The key and list of measurements are included in figure 3.

Photographs of the Individuals

Photographs were made of the animals before shearing and immediately after shearing. These were enlarged to show each individual at approximately 1/18 of its natural size. The photographs are included in this report (figs. 5 to 12).

DISCUSSION

Body Conformation

Thirty-five descriptive items dealing with body conformation were listed on the score-card guide chart. Of these, about nine was the average number used to describe any one individual. The occurrence of a large number of the items was infrequent, due in part to the general high quality of the animals involved. Straightness and length of back, depth and width of body, breadth of breast, closeness to the ground, size of bone, and fullness of leg of mutton were the factors most commonly considered in scoring any one animal.

The four scorings on each sheet completed before the animal was shorn were compared to check the variation of judgment on an individual when made at

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/2 This apparatus was developed in the animal-fiber laboratory of the Bureau of Animal Industry for quickly judging fineness and variability in wool and an account of its development is in the process of publication.

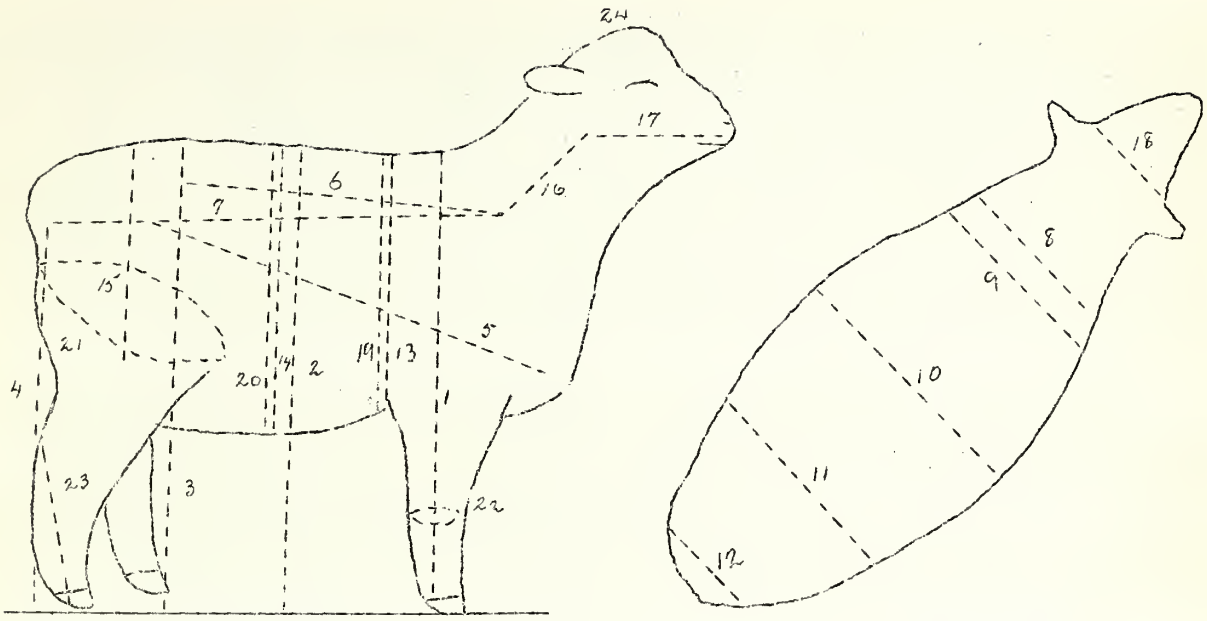
Table 3. - Body measurements

Breed and flock ear-tag number	Age in days	Body weight	1/1	2	3	4	5	6	7	8	9	10	11	12	13
		Pounds	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms
Corriedale															
5-P	439	102	60.75	60.00	60.50	44.75	55.25	52.25	61.50	25.50	26.25	29.25	19.00	8.25	28.75
6-P	435	117	66.50	66.25	68.25	52.00	61.50	55.75	71.00	23.75	25.25	30.50	20.25	9.25	31.75
9-P	430	104	62.75	62.00	64.25	49.75	57.75	53.50	64.75	23.50	26.75	30.25	20.50	8.00	29.50
13-P	427	102	61.25	59.00	60.50	46.50	57.50	52.25	63.25	23.50	26.25	30.00	19.25	8.25	30.25
23-P	391	96	61.25	61.50	62.75	47.50	56.00	51.25	61.75	23.25	25.25	29.50	20.75	8.00	30.00
24-P	382	78	60.25	59.75	61.00	47.00	55.00	52.25	62.50	20.25	21.75	25.25	16.00	7.50	26.50
Hampshire															
2-P	413	130	60.75	61.75	62.00	47.25	61.25	56.75	70.00	29.00	31.00	35.50	21.75	10.50	31.00
6-P	410	136	63.25	64.00	64.25	51.00	61.00	57.00	73.75	28.25	30.00	34.75	21.50	11.00	30.75
14-P	401	107	61.00	60.00	58.75	45.50	61.25	56.00	68.25	24.75	24.25	30.00	18.50	9.00	28.25
15-P	401	132	58.25	57.50	60.00	44.25	63.25	56.75	72.50	28.75	29.25	31.75	21.25	12.00	30.75
21-P	395	115	54.75	54.25	56.75	44.50	61.00	55.50	68.25	27.25	26.75	31.00	21.00	10.00	30.25
22-P	391	108	60.50	59.25	60.75	46.25	61.00	55.75	69.50	25.50	26.00	31.00	20.25	9.50	27.75
Shropshire															
1-P	421	128	64.00	62.50	62.75	47.00	61.50	55.75	71.75	26.50	27.50	31.25	19.75	9.25	31.75
4-P	413	89	59.75	58.50	59.75	45.75	56.50	52.75	64.25	23.75	24.75	28.75	20.00	8.00	27.75
20-P	381	107	58.25	56.75	58.00	45.00	61.00	54.50	69.00	25.25	25.50	29.25	18.50	8.25	28.75
22-P	372	94	60.50	58.00	58.00	43.00	57.50	52.25	65.25	23.50	23.50	28.50	19.25	8.75	28.50
23-P	363	95	59.00	56.75	56.50	43.25	53.25	52.75	65.25	24.00	24.25	28.25	18.75	8.50	28.00
24-P	367	88	57.75	54.50	54.75	43.00	57.50	52.50	66.00	23.00	24.25	27.25	18.75	8.50	27.25
Southdown															
4-P	399	98	49.75	50.75	51.50	38.00	57.50	52.00	67.00	25.75	25.75	31.50	20.25	10.00	27.25
7-P	397	90	50.00	49.25	52.00	38.50	53.25	47.25	63.25	24.75	24.50	30.00	20.00	9.00	26.00
14-P	387	98	52.00	52.00	53.25	39.25	56.00	50.25	66.50	26.25	25.75	29.75	18.75	9.75	27.00
19-P	382	100	53.00	53.25	53.50	40.00	57.00	51.75	63.75	27.50	26.75	31.75	19.50	9.50	28.75
21-P	376	90	52.00	53.50	53.50	40.25	53.25	48.25	63.50	26.25	26.25	31.00	19.00	9.00	26.75
23-P	372	95	48.50	49.00	50.75	36.25	56.50	50.50	64.25	27.25	27.25	31.00	20.75	9.50	27.00

/1 Numbers refer to body measurements on measurement key, fig. 3, page 20; as 1 - Height at withers, etc.

Table 3. - Body measurements - Continued

Breed and flock ear-tag number	14	15	16	17	18	19	20	21	22	23	24	1-13 A	2-14 B	3-15 C
	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms	cms
Corriedale														
5-P	32.75	25.00	15.75	19.00	9.50	92.75	102.25	54.00	8.00	25.25	107.00	32.00	27.25	35.50
6-P	34.50	25.00	16.75	20.00	10.00	93.75	103.50	58.75	9.00	28.50	119.50	34.75	31.75	43.25
9-P	31.50	23.00	17.00	19.25	9.75	92.50	104.00	56.50	8.00	26.50	114.00	31.25	30.50	41.25
13-P	31.00	26.50	17.00	19.50	9.50	94.50	102.25	54.50	8.00	25.75	111.50	31.00	28.00	34.00
23-P	31.50	26.00	15.75	18.25	9.75	92.50	101.25	52.75	8.25	25.75	109.50	31.25	30.00	36.75
24-P	29.50	20.75	16.50	17.50	9.25	80.50	90.50	52.25	8.00	26.25	106.50	33.75	30.25	40.25
Hampshire														
2-P	35.00	24.25	16.25	20.75	11.00	104.00	119.00	56.50	9.50	26.25	111.50	29.75	26.75	37.75
6-P	35.00	24.50	17.00	20.25	11.00	100.00	112.00	62.00	11.00	26.50	119.50	32.75	29.00	41.00
14-P	30.75	23.25	16.25	20.00	10.50	87.00	102.50	57.50	10.00	26.00	112.25	32.75	29.25	35.50
15-P	33.75	26.50	16.50	19.25	11.00	98.50	109.00	63.50	10.00	25.50	116.25	27.50	23.75	33.50
21-P	34.25	23.50	16.50	18.50	10.25	92.00	107.00	57.75	9.25	25.00	108.50	24.50	20.00	33.25
22-P	33.25	23.50	16.00	19.00	11.00	89.00	106.00	58.00	9.25	26.75	113.00	32.75	26.00	37.25
Shropshire														
1-P	34.50	24.00	16.75	19.25	10.50	99.50	107.25	64.75	9.00	25.50	119.00	32.25	28.25	38.75
4-P	29.75	25.25	16.75	18.25	10.25	84.00	96.50	53.50	7.50	25.25	110.00	32.00	28.75	34.50
20-P	33.00	23.00	17.25	18.75	10.50	91.00	104.00	57.75	8.75	25.25	112.25	29.50	23.75	35.00
22-P	30.50	23.75	16.50	18.00	10.75	88.50	97.50	55.50	8.50	25.50	110.00	31.75	27.50	34.25
23-P	31.25	21.50	16.25	18.00	10.00	89.00	101.00	57.50	8.00	24.25	109.25	31.00	25.50	35.00
24-P	29.50	22.25	15.00	17.25	20.25	83.50	94.00	53.25	8.25	23.50	105.00	30.50	25.00	32.50
Southdown														
4-P	31.00	21.25	12.00	18.00	11.00	83.25	101.50	52.75	9.50	22.00	104.00	22.50	19.25	30.25
7-P	28.75	23.50	13.00	17.25	10.25	86.00	97.00	53.00	9.00	23.00	101.50	24.00	20.50	28.50
14-P	30.75	23.00	11.75	17.25	10.50	88.00	100.00	55.50	8.75	24.00	106.00	25.00	21.25	30.25
19-P	32.00	25.00	13.75	17.25	10.25	90.75	101.00	55.00	9.50	22.00	95.00	24.25	21.25	23.50
21-P	31.00	22.00	12.25	17.75	11.00	85.50	101.50	53.50	8.50	22.50	99.50	25.25	22.50	31.50
23-P	30.00	21.25	14.50	16.75	11.00	89.50	102.25	53.50	9.50	22.00	99.25	21.50	19.00	29.50



Side view

Top view

1. Height at withers.
2. Height at middle of back.
3. Height over hook bones.
4. Height at pin bones.

5. Length - shoulder joint to hip joint.
6. Length - front of scapula to hook bone.
7. Length - front of scapula to pin bone.

8. Width at shoulders.
9. Width at heart (chest).
10. Width at middle.
11. Width at hook bones.
12. Width at pin bones.

13. Depth of chest.
14. Depth of middle.
15. Depth of twist (from over hook bones).

16. Length of neck (from scapula to angle of jaw).
17. Length of head (from angle to jaw to nose).
18. Width of head.

19. Circumference of chest.
20. Circumference of middle.
21. Circumference of legs (from stifle to stifle).
22. Circumference of fore shank.
23. Length of rear shank.
24. Length from nose to dock over head and back.

Figure 3. - Key for sheep measurements.

different times. Analysis showed that the four separate scorings checked very closely, so that the material was easily condensed on one card. This seems to indicate that the important points of body conformation appeared the same each time to the judge. This composite score card was then compared with the scoring completed immediately after shearing. A few discrepancies were found in certain body-conformation points before and after shearing but they were only pronounced in the judgments as to the width and depth of twist. It would seem that the presence of wool deceives the eye to some extent on these points. A few peculiarities, such as depressions behind the withers and sloping rump also appeared but their number was limited and relatively unimportant.

Each animal was scored according to her merits, and then each group was placed according to the judging chart contained in Farmers' Bulletin 1199/1, Judging Sheep (fig. 4). The individuals were scored and judged within the breeds, but no effort was made to compare the four breeds. When the score cards were arranged as to the number of desirable physical characteristics appearing for each individual sheep, the placing corresponded to that obtained by the show-ring system of judging.

Scale of points	Possible score	Points given animal judged	
		Student's score	Instructor's score
GENERAL APPEARANCE.-25 points:			
1. Weight; pounds.....	5		
2. Form; straight top and underline, deep, broad, low set for breed, compact, well proportioned.....	10		
3. Quality; hair fine, bone fine but strong, features fine but not delicate, skin pink.....	10		
CONDITION.-12 points:			
4. Flesh covering; deep, even, firm. Points indicating finish are fullness in shoulder and brisket, thick covering over top of shoulders, back, ribs, loin, thick dock.....	12		

Figure 4. - Score card for judging mutton sheep.

/1 Bedell, G. H. Judging sheep. U. S. Dept. Agr. Farmers' Bull. No. 1199, p.3. Revised December 1933.

Scale of points	Possible score	Points given animal judged	
		Student's score	Instructor's score
HEAD AND NECK.-9 points:			
5. Head; clean-cut, strong mouth, thin lips, large nostrils, large, clear eyes, alert look, face short, forehead broad, ears alert not coarse, considerable width between ears ...	5		
6. Neck; short, thick, smoothly joined with shoulder.....	4		
FORE QUARTERS.-10 points:			
7. Shoulders; compact on top, smoothly joined with neck and body and well covered with flesh.....	8		
8. Brisket; full, round, well extended.	1		
9. Legs; straight, short, wide apart...	1		
BODY.-18 points:			
10. Chest; deep, wide, full.....	2		
11. Ribs; well sprung, long, close, and thickly covered.....	4		
12. Back; broad, straight, thickly and evenly covered with flesh.....	6		
13. Loin; wide, thick, well covered....	6		
HIND QUARTERS.-17 points:			
14. Hips; wide apart, level, smooth....	1		
15. Rump; long, level, wide, and thick at dock	4		
16. Thighs; full, deep, wide.....	4		
17. Twist; deep, firm, plump, joined well down on leg.....	5		
18. Legs; straight, short, strong, wide apart.....	1		
19. Udder or scrotum; ewe's udder, well formed, large, soft. In rams, both testicles large and well developed.	2		
WOOL.-9 points:			
20. Quantity; long, dense, even in density and length.....	3		
21. Quality; crimp distinct and even, oil evenly distributed throughout fleece.....	3		
22. Conditions; strong in fiber, clean, soft, and bright.....	3		
TOTAL.....	100		

Figure 4. - Score card for judging mutton sheep - Continued.

It took approximately 3 minutes to fill out each score card regarding body conformation. The actual process of examination and scoring took only slightly more time than ordinary judging. This increase in time was not an important factor and yet a permanent record of the physical body characteristics was thus made available.

When actual body measurements were checked against show-ring judgment the results were found to compare very closely. Three additional measurements were obtained by subtracting the depth of chest from the height at withers to give height of chest from ground, the depth of middle from the height at middle to give height of middle from ground, and the depth of twist from height at hips to give height of twist from ground (table 3).

The following factors on the conformation score card could be definitely checked against the measurements: (1) Size of bone, (2) width of heart, (3) depth of chest, (4) length of back, (5) height, middle to ground, (6) height, twist to ground, (7) length of body, (8) width at pin bones, (9) height, chest to ground, (10) depth of middle, and (11) depth of twist.

Table 4 was prepared to show how the first six points were checked on the score card, and their actual measurement in centimeters. As a whole the group checked rather closely with the measurements. This seems to indicate further that the eye is reasonably accurate in ascertaining mutton characteristics and body form.

Table 5 was prepared to correlate the relationship between placing on body form and width of heart divided by the height at withers, the depth of heart divided by the height at withers, and depth of twist divided by height at hips. The depth of heart divided by the height at withers was the most closely correlated with placing on body form. There was considerable variation between the other two, but when the three were added together there was a distinct correlation to ranking on body form.

WOOL

The fleece on each animal was carefully inspected at each scoring and the items relating to wool were recorded. Uniformity of fiber was the most variable factor, when the four scorings were compared. Other items remained reasonably uniform and it was easy to condense the four score cards into one. No effort was made to score the fleece as to fineness.

The topography of the fleece was easily obtained and checked closely each time. This would seem to be an important section of the description to have on record, especially among those breeds that stress wool covering on the head and legs.

The outer fleece appeared to be normal on a majority of the individuals, although it was listed as open on several. Two of the animals were recognized as carrying a very dense fleece, and all were regarded as possessing a well stapled fleece. None of the animals was classed as having prominent, irregular

Table 4. - Comparison of score-card judgment and six actual body measurements

Breed and flock ear-tag number	Bone			Width of heart			Depth of chest		
	Large	Average	Small	Measurement in cm	Large	Average	Small	Measurement in cm	Deep	Average	Measurement in cm
Corriedale											
5-P		x		8.00	x			26.25	x		28.75
6-P		x		9.00	x			25.25	x		31.75
9-P			x	8.00	x			26.75	x		29.50
13-P	x			8.00	x			26.25	x		30.25
23-P	x			8.25	x			25.25		x	30.00
24-P			x	8.00			x	21.75		x	26.50
Hampshire											
2-P			x	9.50	x			31.00	x		31.00
6-P	x			11.00	x			30.00	x		30.75
14-P			x	10.00	x			24.25		x	28.25
15-P	x			10.00	x			29.25	x		30.75
21-P			x	9.25	x			26.75	x		30.25
22-P			x	9.25			x	26.00	x		27.75
Shropshire											
1-P		x		9.00	x			27.50	x		31.75
4-P			x	7.50		x		24.75		x	27.75
20-P		x		8.75	x			25.50	x		28.75
22-P	x			8.50	x			23.50	x		28.50
23-P			x	8.00	x			24.25		x	28.00
24-P		x		8.25	x			24.25	x		27.25
Southdown											
4-P	x			9.25	x			25.75	x		27.25
7-P			x	9.00		x		24.50	x		26.00
14-P	x			8.25	x			25.75	x		27.00
19-P	x			9.50	x			26.75	x		28.75
21-P			x	8.60		x		26.25		x	26.75
23-P			x	9.50		x		27.25	x		27.00

shoulders and withers. The breeding and quality of the group were responsible for the high score on these points.

Only one animal was rated as possessing indistinct crimp, and none was found to have excessive crimp formation, twisted, greasy, felty binders or nests. The texture and strength of the fiber were considered good in the majority of the group, but slightly over one-half were lacking in uniformity of wool fibers. A majority of animals had fleeces of average length and several had very long wool.

Table 4. - Comparison of score-card judgment and six actual body measurements - Continued

Breed and flock ear-tag number	Length of back				Height middle to ground				Height twist to ground			
	Long	Av-er-age	Short	Meas-ure-ment in cm	Long	Av-er-age	Short	Meas-ure-ment in cm	Long	Av-er-age	Short	Meas-ure-ment in cm
Corriedale												
5-P			x	61.50			x	27.25		x		35.50
6-P		x		71.00		x		31.75	x			43.25
9-P			x	64.75			x	30.50	x			41.25
13-P			x	63.25			x	28.00			x	34.00
23-P			x	61.75			x	30.00	x			36.75
24-P		x		62.50		x		30.25	x			40.25
Hampshire												
2-P			x	70.00		x		26.75	x			37.75
6-P	x			73.75			x	29.00	x			41.00
14-P			x	68.25	x			29.25	x			35.50
15-P			x	72.50			x	23.75			x	33.50
21-P			x	68.25			x	20.00		x		33.25
22-P		x		69.50			x	26.00	x			37.25
Shropshire												
1-P	x			71.75	x			28.25		x		38.75
4-P		x		64.25	x			28.75	x			34.50
20-P			x	69.00			x	27.75	x			35.00
22-P			x	65.25			x	27.50	x			34.25
23-P			x	65.25	x			25.50	x			35.00
24-P			x	66.00		x		25.00	x			32.50
Southdown												
4-P			x	67.00			x	19.25			x	30.25
7-P			x	63.25			x	20.50		x		28.50
14-P			x	66.50			x	21.25		x		30.25
19-P			x	63.75			x	21.25		x		28.50
21-P			x	63.50	x			23.50	x			31.50
23-P			x	64.25			x	19.00			x	29.50

The measurement of 100 fibers on the photomicrographs of the cross sections clearly indicates the variability of uniformity which occurs in the average fleece. There was a marked difference in the average mean diameter and the standard deviation within the flock and likewise among the flocks.

The Hampshire fleeces averaged a little larger in the average mean diameter of fiber than did the Corriedale, Shropshire, or Southdown fleeces. The standard deviation of the six Hampshire fleeces considered varied 1.23 microns as compared to a 3.51 microns variation in the Shropshire fleeces studied. Corriedale 24-P was found to possess the finest fleece of all sheep

Table 5. - Statistical correlation of score-card judgment as compared to actual body measurement

Breed and flock ear-tag number	Placing on body form	Ranking				Ratio			
		A Width at heart	B Depth at heart	C Depth at twist	Composite of A, B, and C	A Width at heart	B Depth at heart	C Depth at twist	Composite of A, B, and C
		Height at withers	Height at withers	Height at hips		Height at withers	Height at withers	Height at hips	
Corriedale									
13-P	1	2	1	3	3	42.85	49.38	38.84	131.07
5-P	2	1	4	2	1	43.20	47.32	41.32	131.84
9-P	3	3	5	5	4	42.62	47.01	35.79	125.42
6-P	4	5	3	4	5	37.96	47.74	36.63	122.33
23-P	5	4	2	1	2	41.22	48.97	41.43	131.62
24-P	6	6	6	6	6	36.09	43.98	34.01	114.08
Hampshire									
15-P	1	2	2	1	1	50.21	52.34	44.16	146.71
6-P	2	4	4	6	4	47.43	48.61	38.13	134.17
2-P	3	1	3	4	2	51.02	51.02	39.11	141.15
21-P	4	3	1	2	3	48.85	55.25	41.40	145.50
14-P	5	6	5	3	6	39.75	46.31	39.57	125.63
22-P	6	5	6	5	5	42.96	45.86	38.68	127.52
Shropshire									
1-P	1	2	1	4	1	42.97	49.60	38.24	130.81
20-P	2	1	2	3	2	43.77	49.35	39.65	132.77
22-P	3	6	5	6	6	38.84	47.10	38.01	123.95
23-P	4	5	3	5	5	41.10	47.45	38.06	126.61
24-P	5	3	4	2	4	41.99	47.18	40.63	129.80
4-P	6	4	6	1	3	41.42	46.44	42.25	130.11
Southdown									
4-P	1	2	2	5	3	51.75	54.77	41.26	147.78
19-P	2	4	3	1	2	50.47	54.24	46.72	151.43
14-P	3	5	5	3	5	49.51	51.92	43.19	144.62
23-P	4	1	1	4	1	56.18	55.67	41.87	153.72
7-P	5	6	4	2	4	49.00	52.00	45.19	146.19
21-P	6	3	6	6	6	50.48	51.44	41.12	143.04

studied with an average mean diameter of 21.74 microns as compared to the fleece of Hampshire 14-P with an average mean diameter of 28.38 microns, the coarsest fleece in the group. Corriedale 5-P had a standard deviation of 3.47 microns as compared to 7.48 microns for Shropshire 1-P, the smallest and largest respectively. When the coefficient of variation was considered, it was found that Corriedale 5-P ranked first with 14.38 percent and Shropshire 1-P was last with 26.83 percent.

Table 6 gives the average mean diameter in microns, the standard deviation in microns, and the coefficient of variation in percentage for each animal.

Table 6. - Comparison of the wool characteristics of the experimental sheep studied/1

Breed and flock ear-tag number	Number fibers measured	Average mean diameter	Standard deviation	Coefficient of variation
		Microns	Microns	Percentage
Corriedale				
5-P	100	24.12	3.47	14.38
6-P	100	26.44	5.47	20.74
9-P	100	26.29	5.17	19.59
13-P	100	24.62	4.55	18.44
23-P	100	24.40	4.84	19.83
24-P	100	21.74	3.94	18.12
Hampshire				
2-P	100	27.67	4.95	17.89
6-P	80	25.73	4.76	18.49
14-P	90	28.98	5.83	20.10
15-P	100	27.37	4.79	17.50
21-P	100	27.43	4.65	16.95
22-P	90	28.40	4.60	16.19
Shropshire				
1-P	100	28.29	7.48	26.83
4-P	100	22.60	4.79	21.23
20-P	100	24.25	5.44	22.06
22-P	100	25.06	4.58	18.23
23-P	85	26.75	5.29	19.59
24-P	100	28.33	5.18	18.29
Southdown				
4-P	100	23.08	4.57	19.80
7-P	100	25.05	4.56	18.02
14-P	100	24.37	6.14	25.29
19-P	100	24.53	4.54	22.58
21-P	100	27.39	7.40	26.01
23-P	100	23.46	3.89	16.59

/1 Wool samples were taken from right side in every instance.

Table 6. - Comparison of the wool characteristics of the experimental sheep studied - Continued

Breed and flock ear-tag number	Wool grades/1		Age in days at shearing	Fleece weight unscoured	Body weight after shearing
	Right side	Right thigh		Pounds	Pounds
Corriedale					
5-P	52^{s} average	52^{s} average	439	9.7	102
6-P	48^{s} not uniform	48^{s} not uniform	435	17.6	117
9-P	48^{s} high	48^{s} high	430	14.3	104
13-P	48^{s} not uniform	48^{s} not uniform	427	11.2	102
23-P	48^{s} high	48^{s} high	391	12.2	96
24-P	52^{s} average	52^{s} average	382	11.5	78
Hampshire					
2-P	48^{s} average	48^{s} average	413	9.5	130
6-P	52^{s} average	48^{s} average	410	8.2	136
14-P	44^{s} not uniform	44^{s} not uniform	401	8.8	107
15-P	52^{s} average	48^{s} average	401	8.3	132
21-P	52^{s} uniform	48^{s} uniform	395	6.8	115
22-P	52^{s} average	52^{s} average	391	7.1	108
Shropshire					
1-P	48^{s} not uniform	44^{s} not uniform	421	11.6	128
4-P	56^{s} average	52^{s} not uniform	413	6.5	89
20-P	52^{s} average	52^{s} average	381	8.6	107
22-P	52^{s} average	52^{s} not uniform	372	7.5	94
23-P	48^{s} not uniform	48^{s} low average	368	7.3	95
24-P	52^{s} average	48^{s} average	367	6.8	88
Southdown					
4-P	52^{s} average	48^{s} not uniform	399	8.5	98
7-P	52^{s} average	52^{s} not uniform	397	9.6	90
14-P	56^{s} average	52^{s} average	387	7.6	98
19-P	48^{s} average	48^{s} average	382	8.6	100
21-P	54^{s} low average	52^{s} low average	376	6.4	90
23-P	56^{s} average	56^{s} low average	372	4.9	95

/1 Spinning count and uniformity were determined by use of the comparator. In some cases the comparator rating does not agree with the grade obtained by the measured fineness of the wool.

When the cross sections of the side and thigh samples were prepared and studied under 500 diameters magnification, considerable variation was evident between the two samples. The cross sections from the thigh graded somewhat lower on the average and lacked the average uniformity of the side samples.

Table 6 gives the wool grades for each sample with notes on the uniformity of each.

It is interesting to note the wide variation between the actual measurements of uniformity computed from the cross sections and the estimated uniformity as checked on the score cards. The two did not check to any degree of consistency, which further emphasizes the difficulty of judging the uniformity of fibers with the naked eye.

SUMMARY AND CONCLUSIONS

An effort has been made to present some of the background of the present system of registration and judging of sheep in the United States. Certain weaknesses of this method of registration have been indicated. The absence of definite standards for genetic and physical characteristics which an animal should meet before becoming eligible for registry is an example of this point. The show-ring system of judging with its arbitrary decisions and scarcity of records has its weak points. However, regardless of the possible shortcomings of our systems in the past, remarkable progress has been made in improvement of the sheep industry in the United States during the last 100 years.

Those engaged in the sheep industry are interested in continuing this improvement in the general level of excellence, but it is difficult to proceed beyond a certain point without more specific goals and continual improvement of our methods. It would seem that the sheep industry, to make the greatest possible progress, must reach out and acquire new and better methods.

For such helpful suggestions as they may afford, the English flock system of registry and the method of scoring the Württemberger breed in Germany were studied, and a modified German score card was tried out at the National Agricultural Research Center, Beltsville, Md.

An examination of the English flock system would seem to indicate that such a closely knit organization and management as this system uses is an advantage in sheep-improvement work. The marking of the animals by official representatives of the breed might be worthy of consideration in this country, for it gives the representatives an opportunity to verify the type of animal that is to be registered. This system as used in England does have the disadvantage that the merits and identity of individual ewes are lost in the group Thus it is almost impossible to trace the progeny of the females.

Several phases of the scoring method used by breeders in Germany are worthy of consideration. Each individual is required to meet a specific set of standards before it is eligible for registration, and an official

representative of the breed inspects and scores each animal to see that it meets these requirements. A score card similar to the one used in this study is filled out by the representative as he examines the animal. This card remains in the association files as a definite record of the physical characteristics of the animal. Tattooing and eartagging are done immediately after the scoring has been completed, so that complete information is permanently available

An unusual feature of this German system is that, even though an animal is recorded in the association, it must pass an annual inspection on type and progeny performance. The yearly inspection eliminates those animals that are judged unworthy of breed type and, more important yet, it provides for the elimination of those animals that do not transmit their desirable qualities to their progeny. This might be considered a modified record of performance test.

The Germans make further use of the score-card idea in the sale ring. An outline figure of a sheep appears opposite the name and breeding of each animal in the sale catalog. The prospective buyer may inspect the animals in the lots before the sale and record his findings by a series of symbols. When the animals enter the sale ring the buyer has a graphic picture of the desirable and undesirable physical characteristics of each animal before him. Close inspection has recorded points that distance may conceal.

Criticism may be made of this method of scoring, on the basis of extra time and labor involved, but it would seem that with careful inspection and adequate elimination, the general level of the flock and breed would be increased enough to more than offset the additional money and energy expended.

The actual field use of the score card, which was developed in this study, indicated that it is practical, simple to use, quick, and comparatively complete. Approximately 5 minutes were required to examine and score each animal. There are several factors such as length of neck and thickness of fleshing which might be included to present a very complete picture. The high quality of the animals included in the study necessitated the use of fewer symbols than might be needed for the average farm flock. The four body conformation scorings completed before shearing checked very closely with the one made immediately after shearing. In practical use, the body-form section of the score card might be checked while the animal is carrying a short fleece, and the wool section recorded to the best advantage just before the animal is shorn. This would necessitate two scorings, but body form would probably be scored a little more accurately and in considerably less time while the animal is carrying a short fleece.

The wool section of the score card supplied a comparatively complete set of details on the fleece. All of the individual points except uniformity of fibers were relatively easy to obtain.

It would seem that county agents, Smith-Hughes instructors, livestock-judging coaches, and boys and girls interested in judging animals might find a score card of this type helpful. It would serve as a training guide on which each could permanently record his opinion. After the completion of a class a record would be available, giving the actual physical characteristics

in which one animal excels another. It is equally important to recognize both the desirable and undesirable physical characteristics of each individual. For example, it is important to recognize that three of the animals are equally deep bodied, and record them as such, rather than merely to accept their excellence in this respect as would otherwise be done.

In show-ring application the judge at the local or county fair might record his judgments on a score card so that breeders and exhibitors could readily see the desirable and undesirable points on which he based his judgment of the animals in the ring.

The practical breeder who wishes to cull and improve his flock with considerable care might find a score card of this type a handy and valuable record of the merits of each individual. If a brief survey of the cards indicated that three-quarters of the ewes possessed narrow, shallow twists, it would be imperative for him to obtain a sire deep and wide in this respect.

After the completion of score cards for several generations the breeder could check the desirable and undesirable physical characteristics of the progeny against their parent stock. A predominance of undesirable points appearing in the progeny of a specific ewe would indicate her inability to nick with the ram or transmit her desirable characteristics to her progeny, and thus culling would be suggested.

The wool studies emphasized the great variability in fineness and uniformity of fibers within the same fleece, among fleeces of the same breed, and among fleeces of the various breeds. They further indicated the extreme difficulty that is encountered when uniformity and fineness are judged with the naked eye. The large fibers attract the eye and the small fibers tend to be disregarded.

It would seem that the use of cross sections enlarged to 500 diameters magnification would eliminate the chance of error, and place the selection of fleeces in a wool show on a more scientific basis. The cross sections would supplement those points, such as luster and crimp, that are evident to the eye and hand.

The systems of registration of sheep in use in the United States present an enormous field for constructive study. It would seem that considerable work of this type would be valuable as a basis for the development of improved methods. The use of the score card through several generations would provide interesting and constructive data on body conformation, wool characteristics, and genetic factors. Additional studies would undoubtedly bring about an improved and simplified method of scoring the physical characteristics of sheep and other farm animals that could be directly applied to breed improvement.

In order to summarize the results of the study, the advantages and disadvantages of the modified systems of scoring and registration suggested in this study are listed as follows:

Advantages

1. If inspection by a breed representative was required before registration, the general level of the breed and the sheep industry would be raised, since animals would have to meet a definite set of requirements concerning physical characteristics before they became eligible for registration.

2. The yearly inspection of animals used in the German system, would eliminate from the breeding flock individuals failing to maintain satisfactory breed type or proving themselves of doubtful breeding ability as shown by their progeny.

3. Accuracy of registration and identification would be increased by tattooing and eartagging of animals by official representatives of the breed associations.

4. The score cards suggested in this study are simple and relatively easy to use.

5. The use of the score card would provide a permanent record of the physical characteristics of each individual.

6. The use of a score card by the judge would record for the information and guidance of the breeders and exhibitors those points which he considers desirable and undesirable in the animals shown.

7. Judges, Smith-Hughes instructors, county agents, and students could use the score card to record and compare their opinions of the animals in the class. Students might find the use of the score card especially helpful in fixing certain desirable and undesirable physical characteristics in their own minds in practice judging work.

Disadvantages

1. The size of the country and the widely scattered sheep population would make the inspection a difficult task and involve considerable expense.

2. Official representatives of the breed might become prejudiced or biased in their judgments as to requirements for registration or toward a particular breeder.

3. Additional time and labor would be required to score each animal.

4. The supervision of tattooing and scoring the animals by the breed-association representatives would be more expensive than the handling of this operation by the breeder himself.

Table 7. - Breeding identification of the sheep involved in the study

Breed and flock eartag number	Born	Sire	Dam
Corriedale			
5-P	1-22-36	8-M U.S.D.A. Corr.	22-F U.S.D.A. Corr.
6-P	1-26-36	8-M U.S.D.A. Corr.	31-J U.S.D.A. Corr.
9-P	1-31-36	8-M U.S.D.A. Corr.	5-J U.S.D.A. Corr.
13-P	2- 3-36	3-M U.S.D.A. Corr.	30-J U.S.D.A. Corr.
23-P	3-10-36	8-M U.S.D.A. Corr.	2-H U.S.D.A. Corr.
24-P	3-19-36	W-144 J. F.& H.H. Walker	16-L U.S.D.A. Corr.
Hampshire			
2-P	2-17-36	29-S.N.(104556)Imp. Chilmark Final M162	14-F U.S.D.A. Hamp.
6-P	2-20-36	29-S.N.(104556)Imp. Chilmark Final M162	10-M U.S.D.A. Hamp.
14-P	3- 1-36	443 (86806) J. C. Penny	4-F U.S.D.A. Hamp.
15-P	3- 1-36	443 (86806) J. C. Penny	14-I U.S.D.A. Hamp.
21-P	3- 6-36	443 (86806) J. C. Penny	32 (228941) Imp.Bred by E.Clifton Brown.
22-P	3-10-36	29 S.N.(104556)Imp. Chilmark Final M 162	22-L U.S.D.A. Hamp.
Shropshire			
1-P	2- 9-36	13-Imp. E. Craig Tanner	8-L U.S.D.A. Shrop.
4-P	2-17-36	13-Imp. E. Craig Tanner	7-I U.S.D.A. Shrop.
20-P	3-20-36	85-Imp. T. A. Butter	64 Imp. T. A. Butter.
22-P	3-29-36	34-Imp. J. N. Ritchie	19-K U.S.D.A. Shrop.
23-P	4- 2-36	34-Imp. J. N. Ritchie	16-H U.S.D.A. Shrop.
24-P	4- 3-36	34-Imp. J. N. Ritchie	36-I U.S.D.A. Shrop.
Southdown			
4-P	3- 3-36	839-Imp. Aldenham	9-J U.S.D.A. S.Down
7-P	3- 5-36	839-Imp. Aldenham	53-J U.S.D.A. S.Down
14-P	3-14-36	839-Imp. Aldenham	40-J U.S.D.A. S.Down
19-P	3-19-36	360-Imp. Luton Hoo	418-Imp. Don Head.
21-P	3-25-36	839-Imp. Aldenham	23-Imp. Luton Hoo
23-P	3-29-36	360-Imp. Luton Hoo	3-K U.S.D.A. S.Down

Figure 5 - Corriedales

Before Shearing - Photographed March 10, 1937

5-P

6-P

9-P

13-P

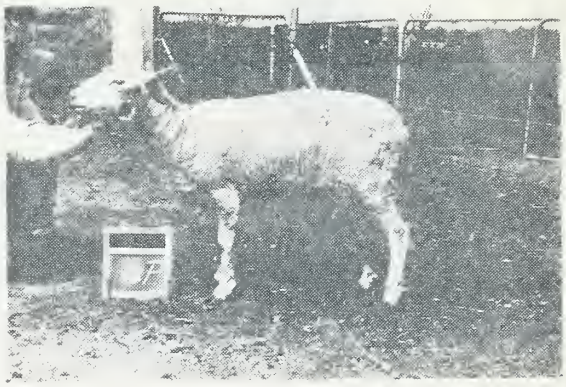
23-P

24-P

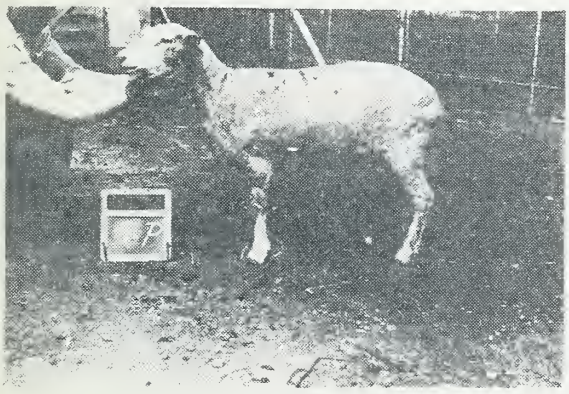
Figure 6 - Corriedales

After Shearing - Photographed April 7, 1937

5-P



6-P



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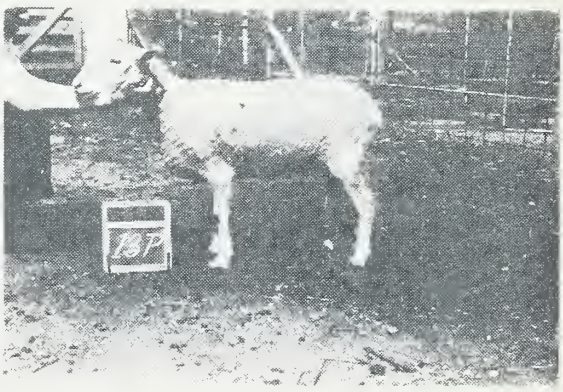

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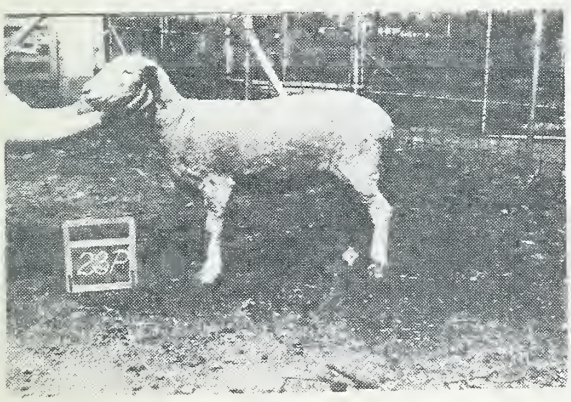

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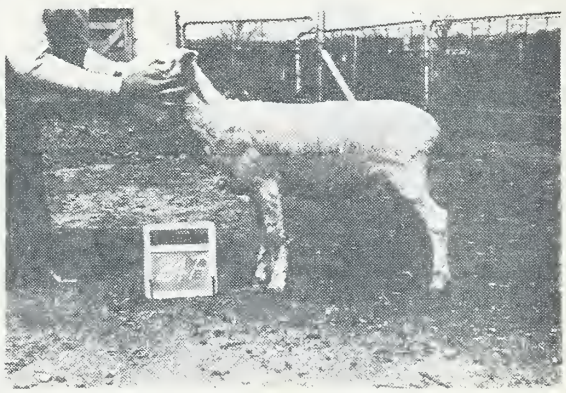


24-P

Figure 7 - Hampshires

Before Shearing - Photographed March 10, 1937

2-P

6-P

14-P

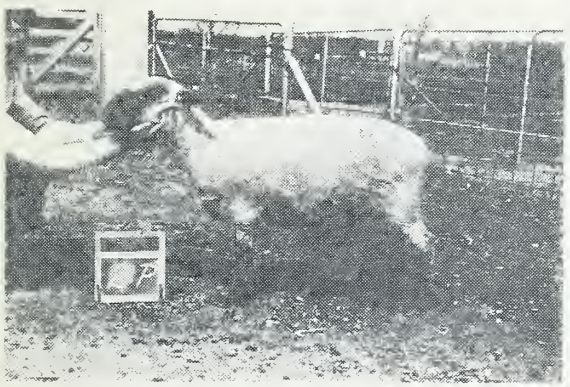
15-P

21-P

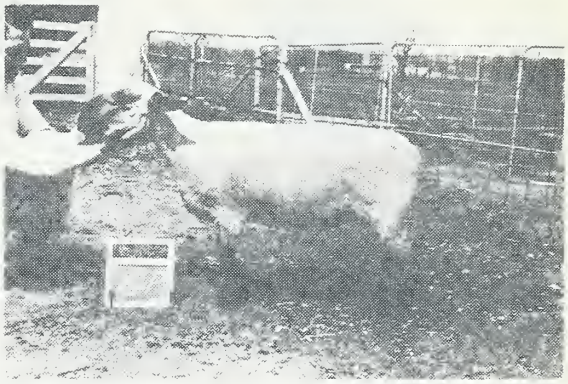
22-P

Figure 8 - Hampshires

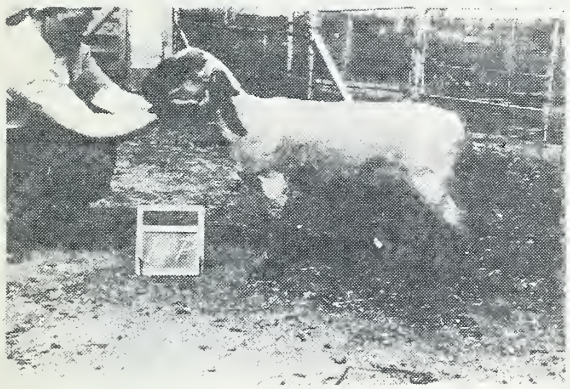
After Shearing - Photographed April 7, 1937



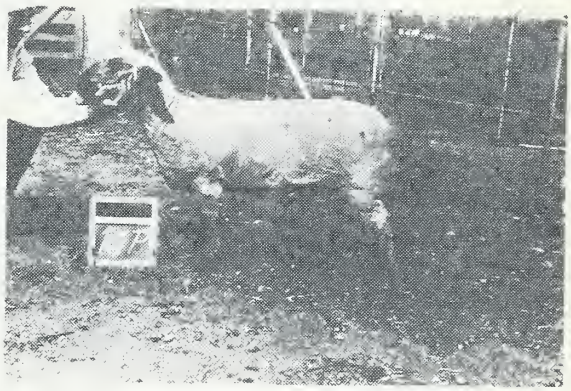
2-P



6-P



14-P



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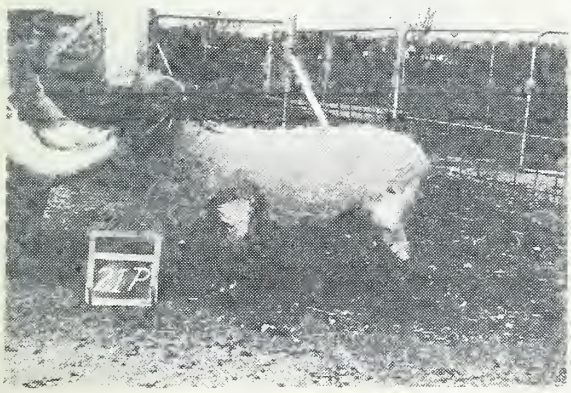

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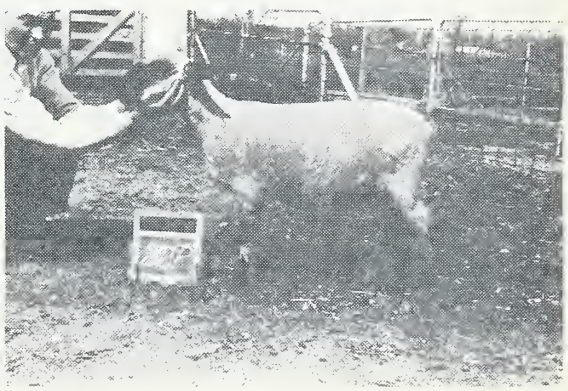


22-P

Figure 9 - Shropshires

Before Shearing - Photographed March 10, 1937

1-P

4-P

20-P

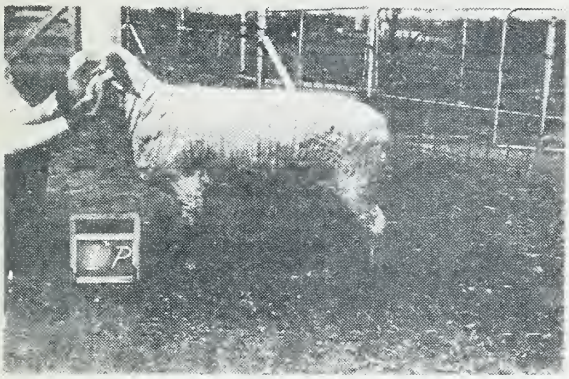
22-P

23-P

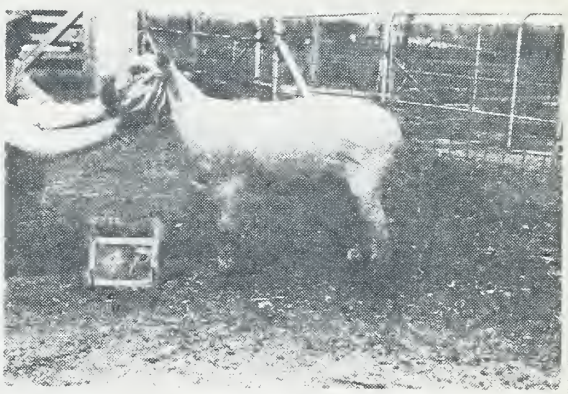
24-P

Figure 10 - Shropshires

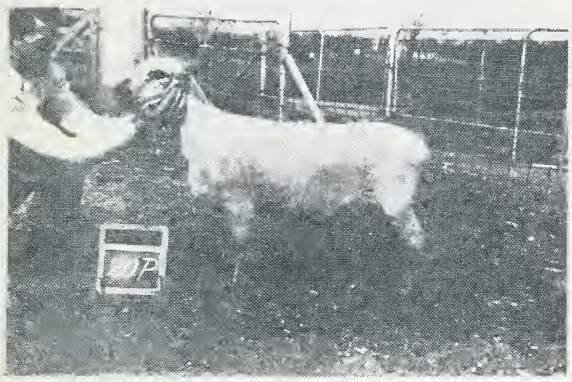
After Shearing - Photographed April 7, 1937



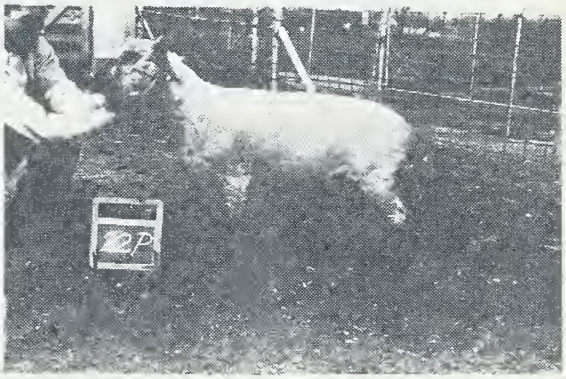
1-P



4-P



20-P



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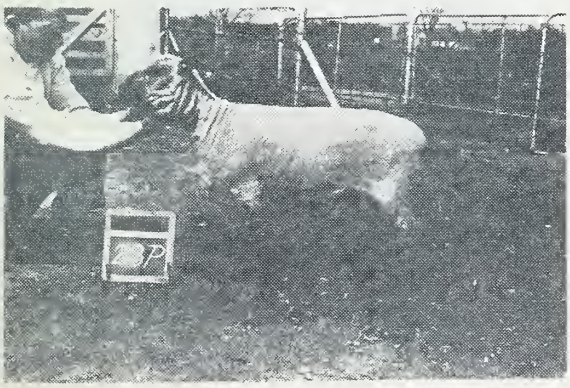
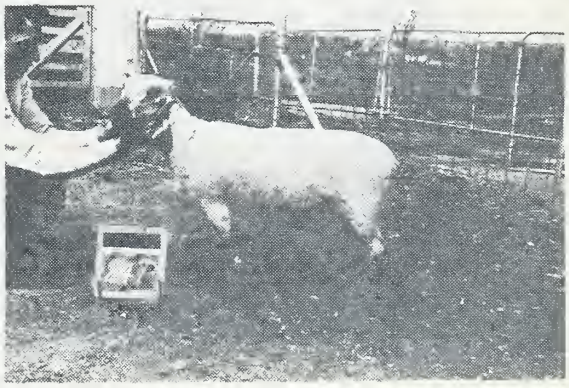


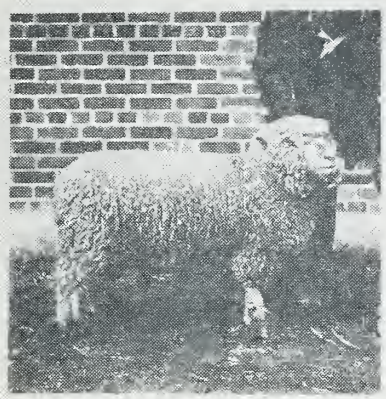
23-P



24-P

Figure 11 - Southdowns

Before Shearing - Photographed March 10, 1937



4-P

7-P

14-P

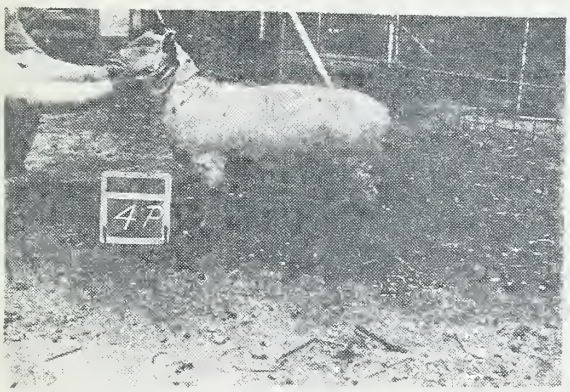
19-P

31-P

23-P

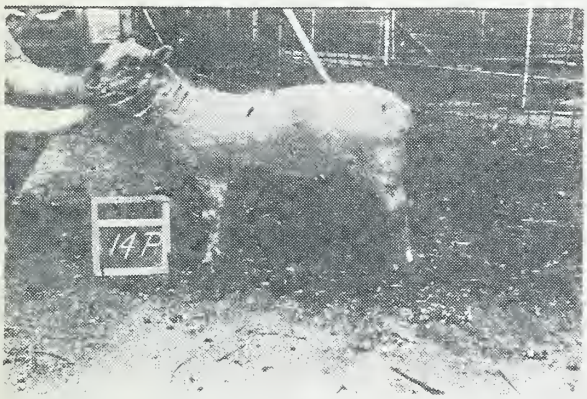
Figure 12 - Southdowns

After Shearing - Photographed April 7, 1937

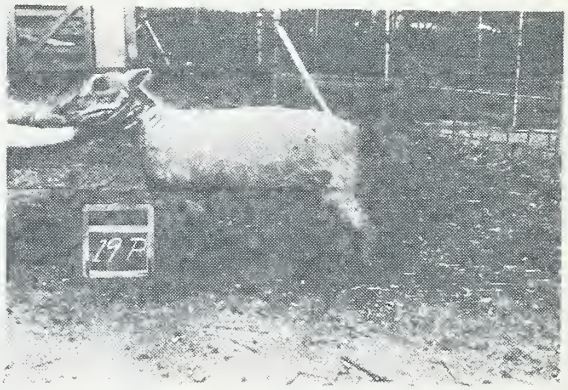


4-P

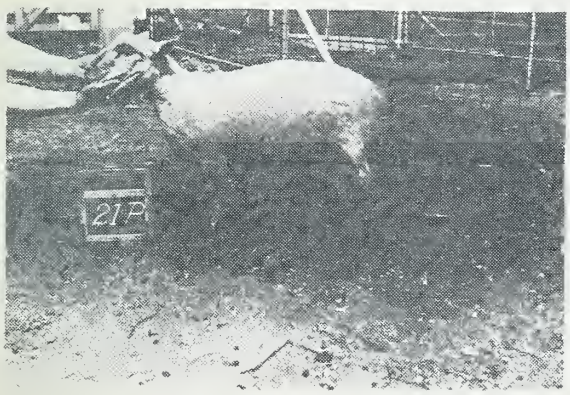
7-P



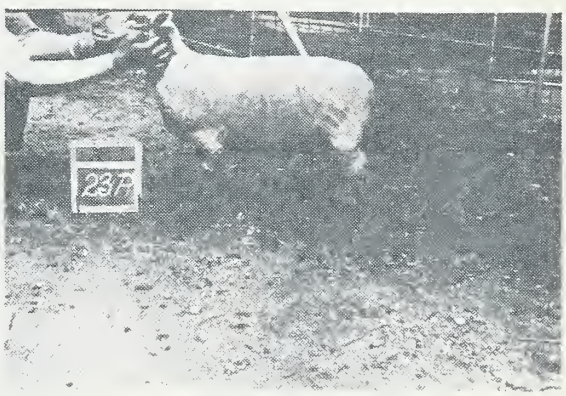
14-P



19-P

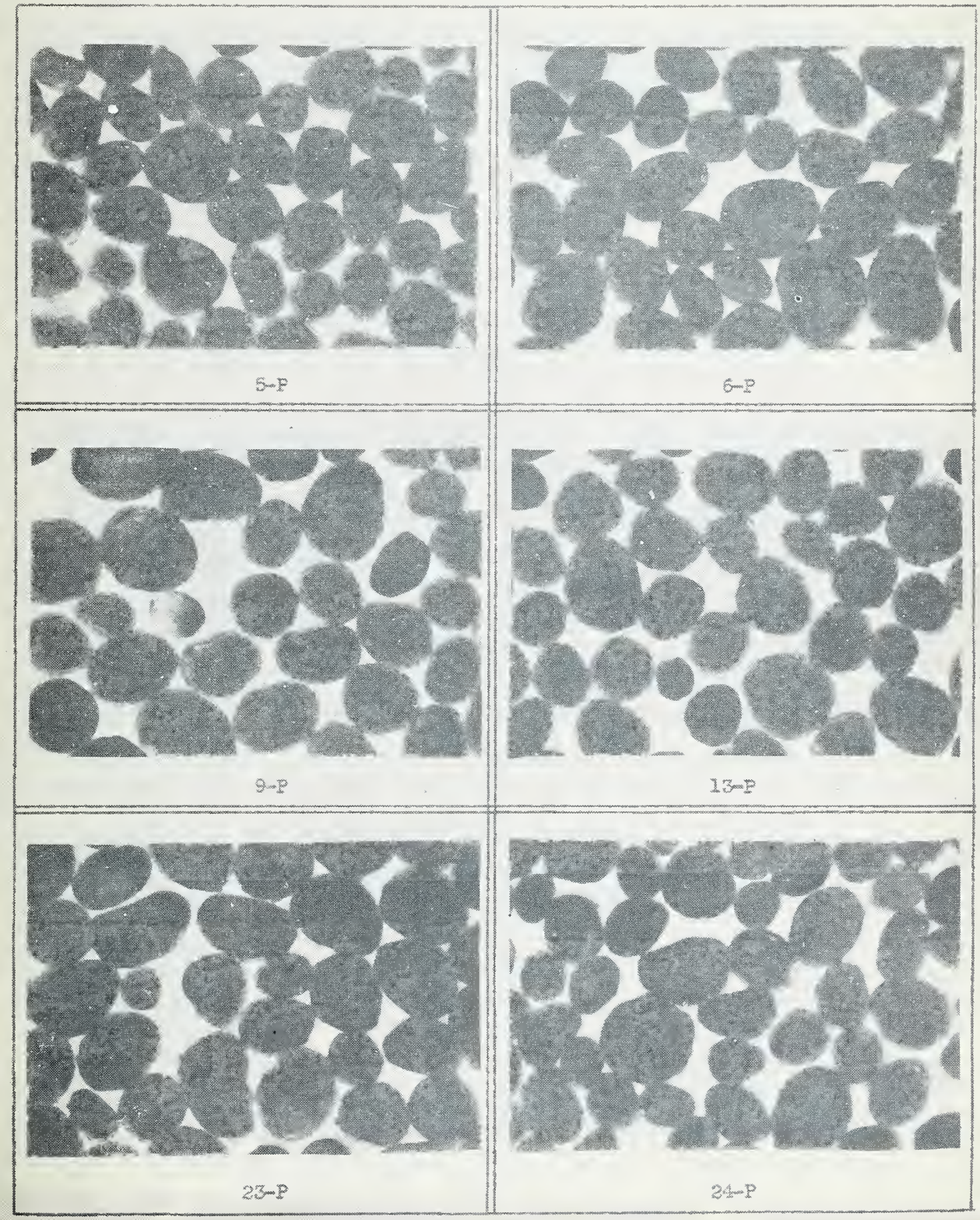


21-P



23-P

Figure 13 - Corriedale Fleece Sample
diameters
Cross Section - Right Side - 500/Magnification



5-P

6-P

9-P

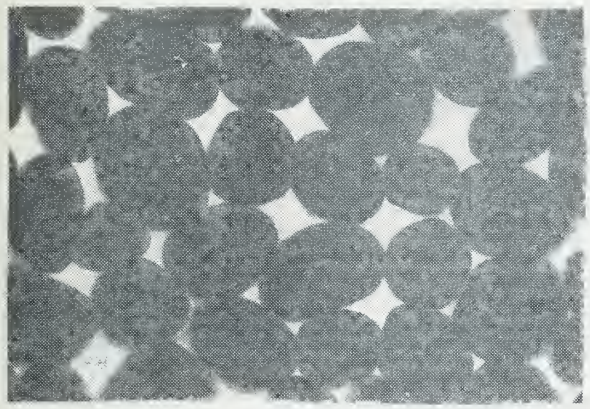
13-P

23-P

24-P

Figure 14 - Hampshire Fleece Sample

Cross Section - Right Side - 500/Magnification diameters



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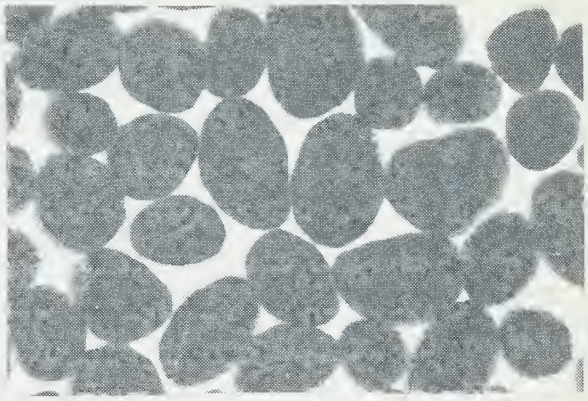
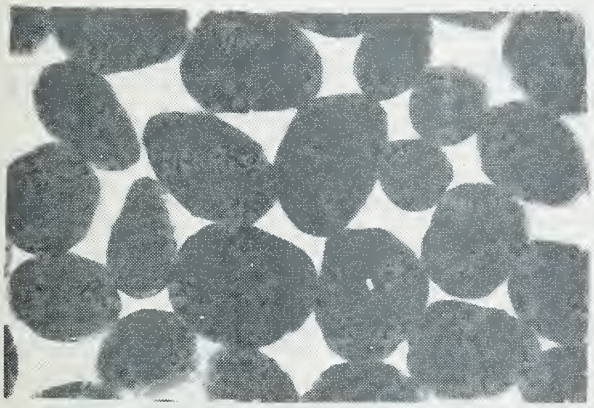
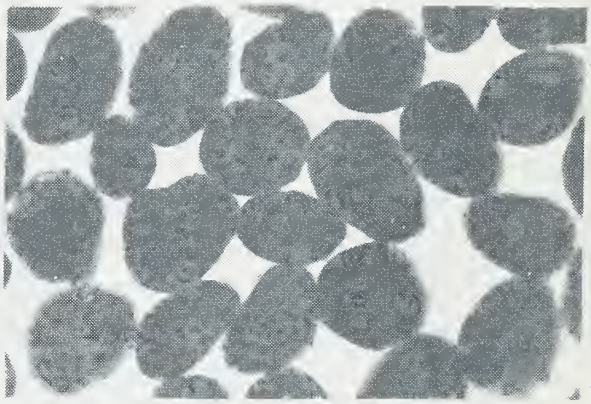


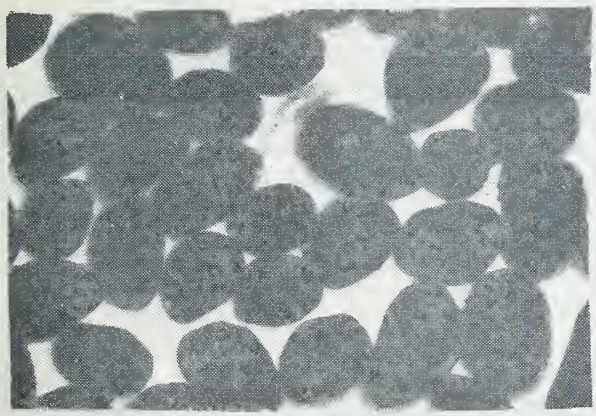
6-P



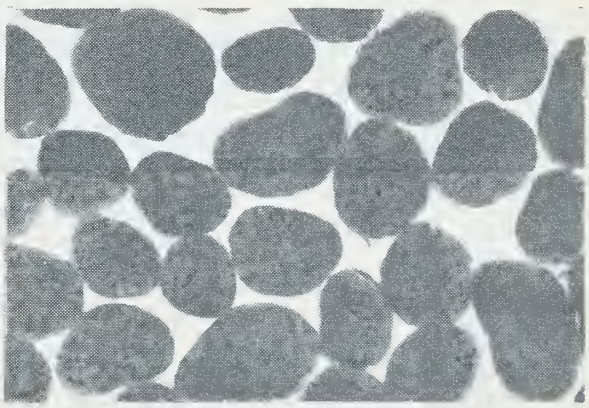
14-P



15-P

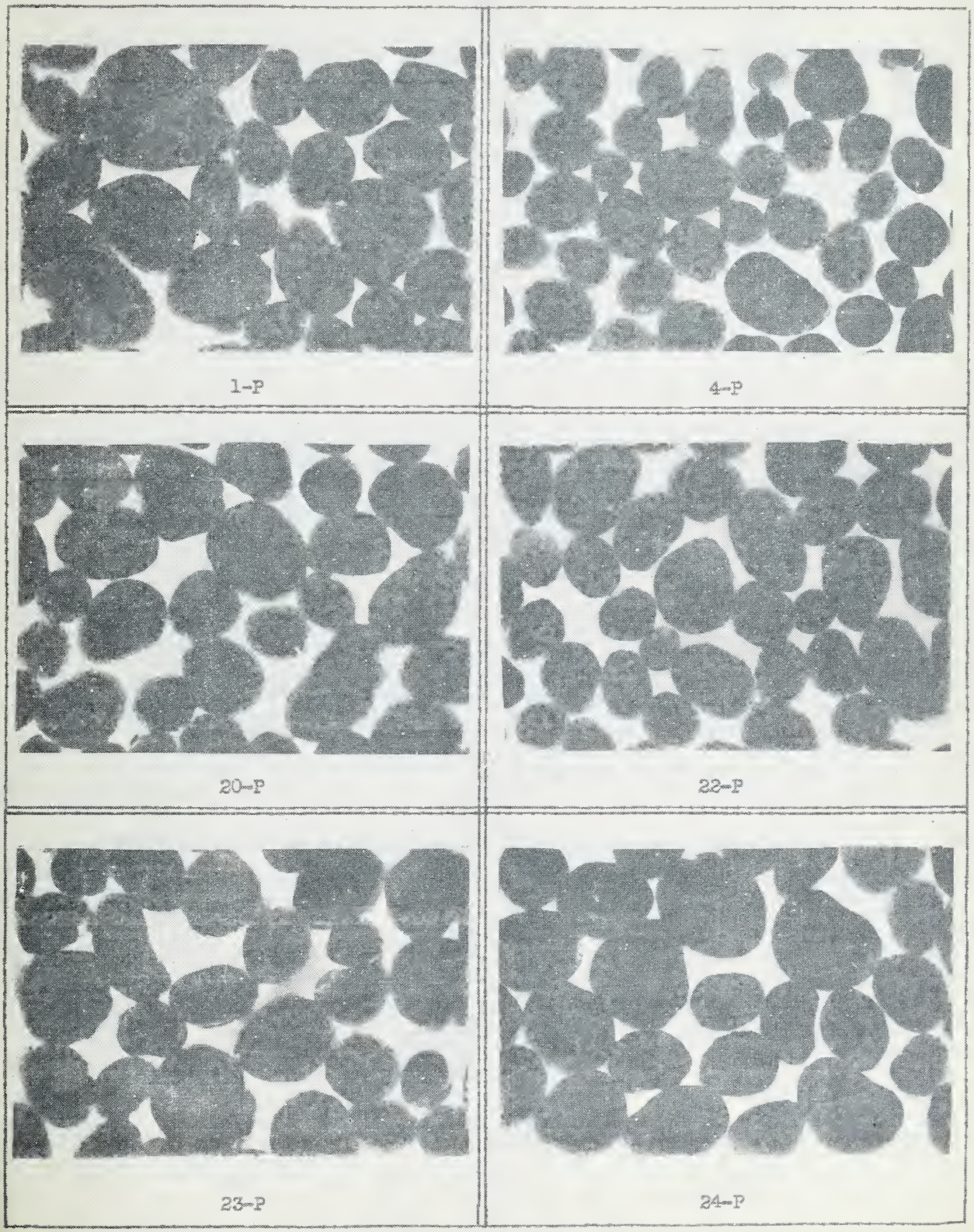


21-P



22-P

Figure 15 - Shropshire Fleece Sample
diameters
Cross Section - Right Side - 500/Magnification



1-P

4-P

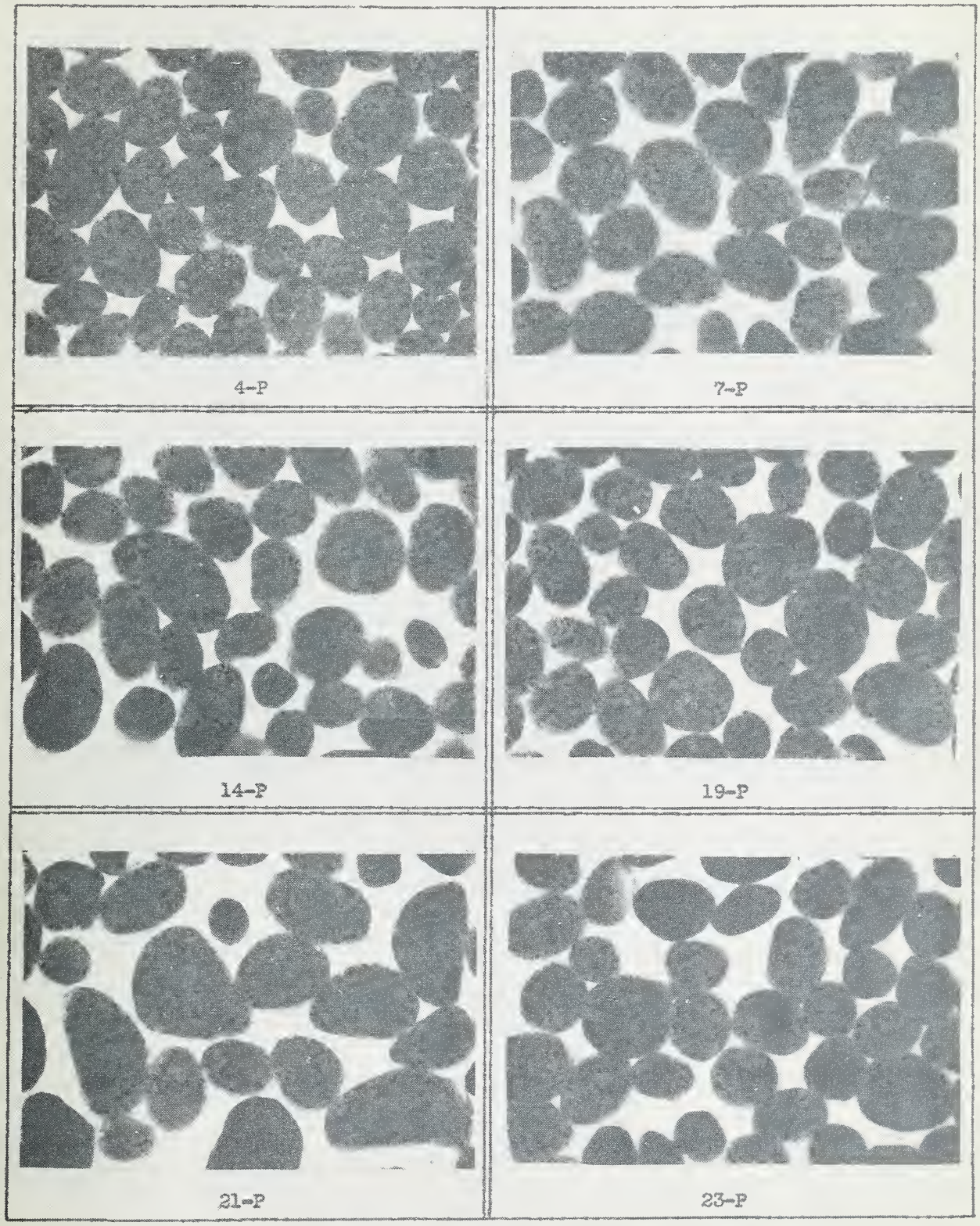
20-P

22-P

23-P

24-P

Figure 16 - Southdown Fleece Sample
diameters
Cross Section - Right Side - 500/Magnification



4-P

7-P

14-P

19-P

21-P

23-P

Extension Service Circular 272 November 1937

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UNITED STATES DEPARTMENT OF AGRICULTURE
Extension Service .... C. W. WARBURTON *Director*
Division of Cooperative Extension .... C. B. SMITH *Chief*
Washington, D.C.